



U.S. Department of Energy
Energy Efficiency and Renewable Energy

biomass program

OBP Thermochemical R&D Platform

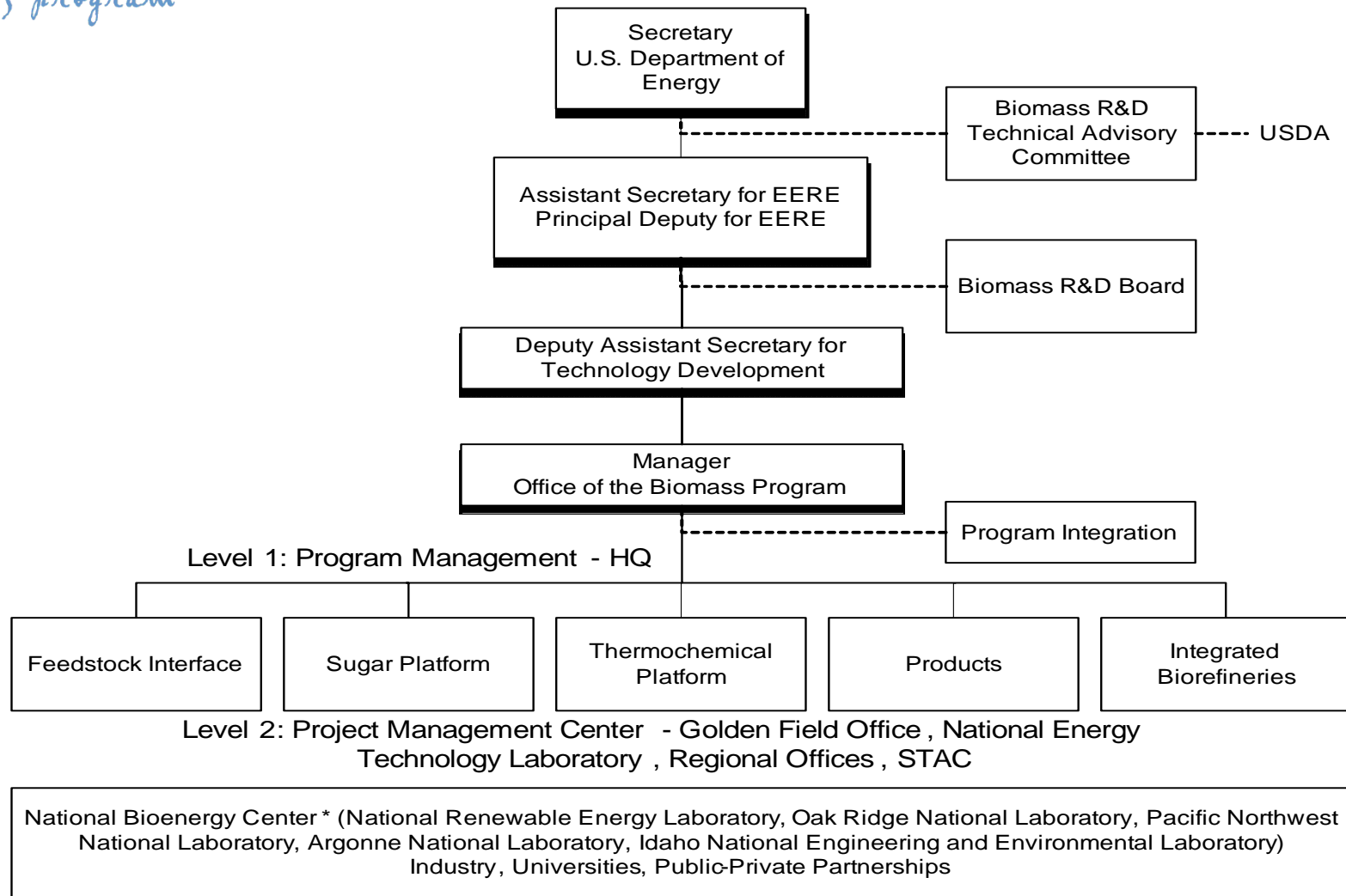
**DOE OBP Thermochemical Platform Review Meeting
June 7-8, 2005**

Paul Grabowski - DOE OBP



Organizational Overview

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Level 3: Project Implementation (performers of R &D)

* Each National Laboratory of the NBC has a designated relationship manager which is the primary liaison between the Laboratory and Level 1 Program Management



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- **Congress**

- Biomass R&D Act of 2000
 - Directed Biomass DOE/USDA Coordination
 - Biomass R&D Technical Advisory Committee
 - Biomass R&D Board
- Farm Bill of 2002 (Title IX)

- **Executive**

- National Energy Policy
- White House Report in Response to the National Renewable Energy Production on Federal Lands



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TC Platform R&D Portfolio

- Fit and Appropriateness
 - Mission of OBP
- Short vs. Long Term
 - FY08 Solicitation
 - Longer Term with higher payback
- Core vs. Applied
 - Lab, industry based.



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- Develop Integrated BioRefineries
- Reduce Dependency on Foreign Oil



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- Technology Moves us along a Pathway
 - Barriers and the WBS
- Planned and Managed technology Development
 - Stage Gate



Why TC Platform?

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- Utilize all available feedstock
- Fully Integrate TC technologies.



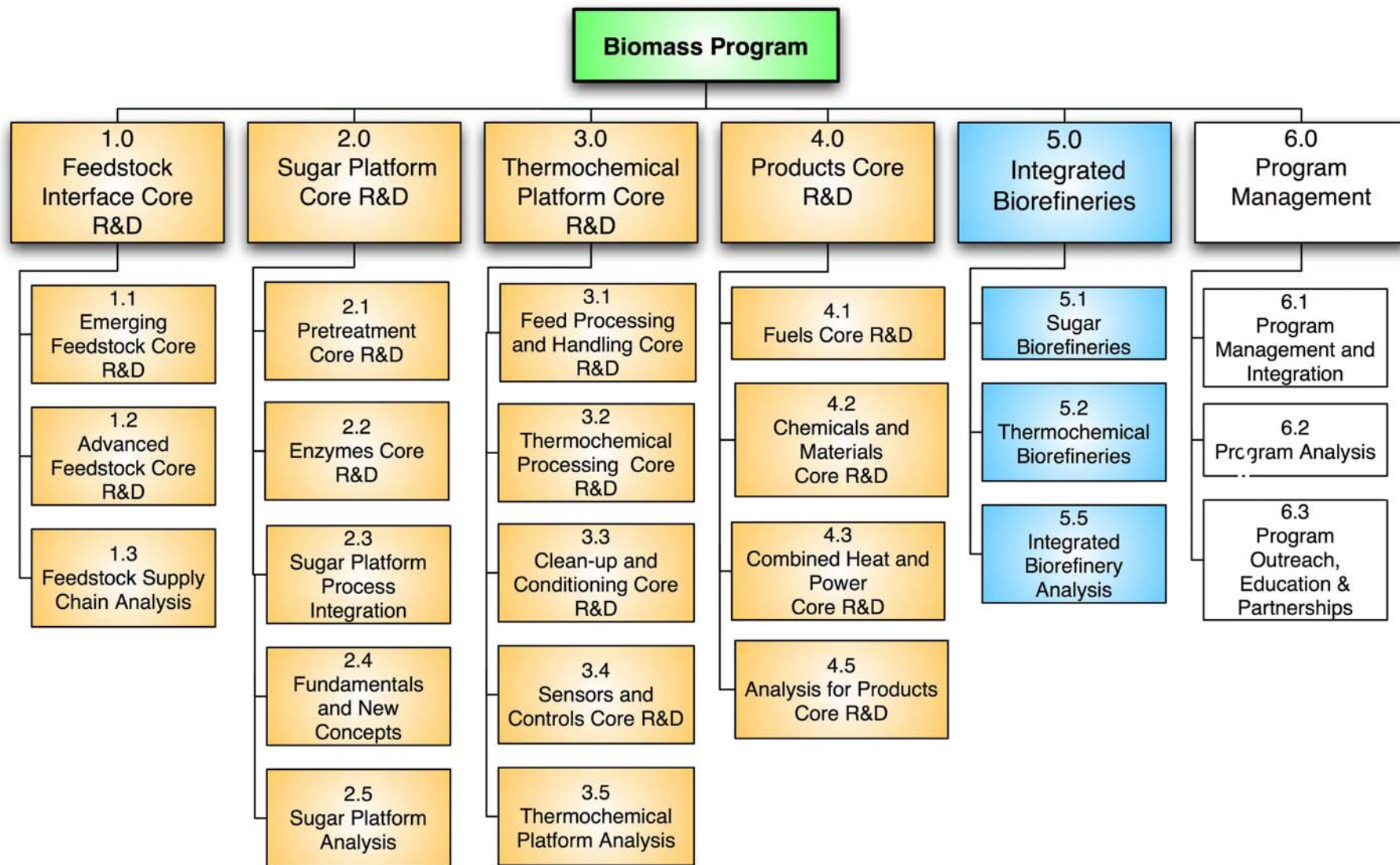
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- Barriers Define the focus of the WBS



Work Breakdown Structure Removing Barriers

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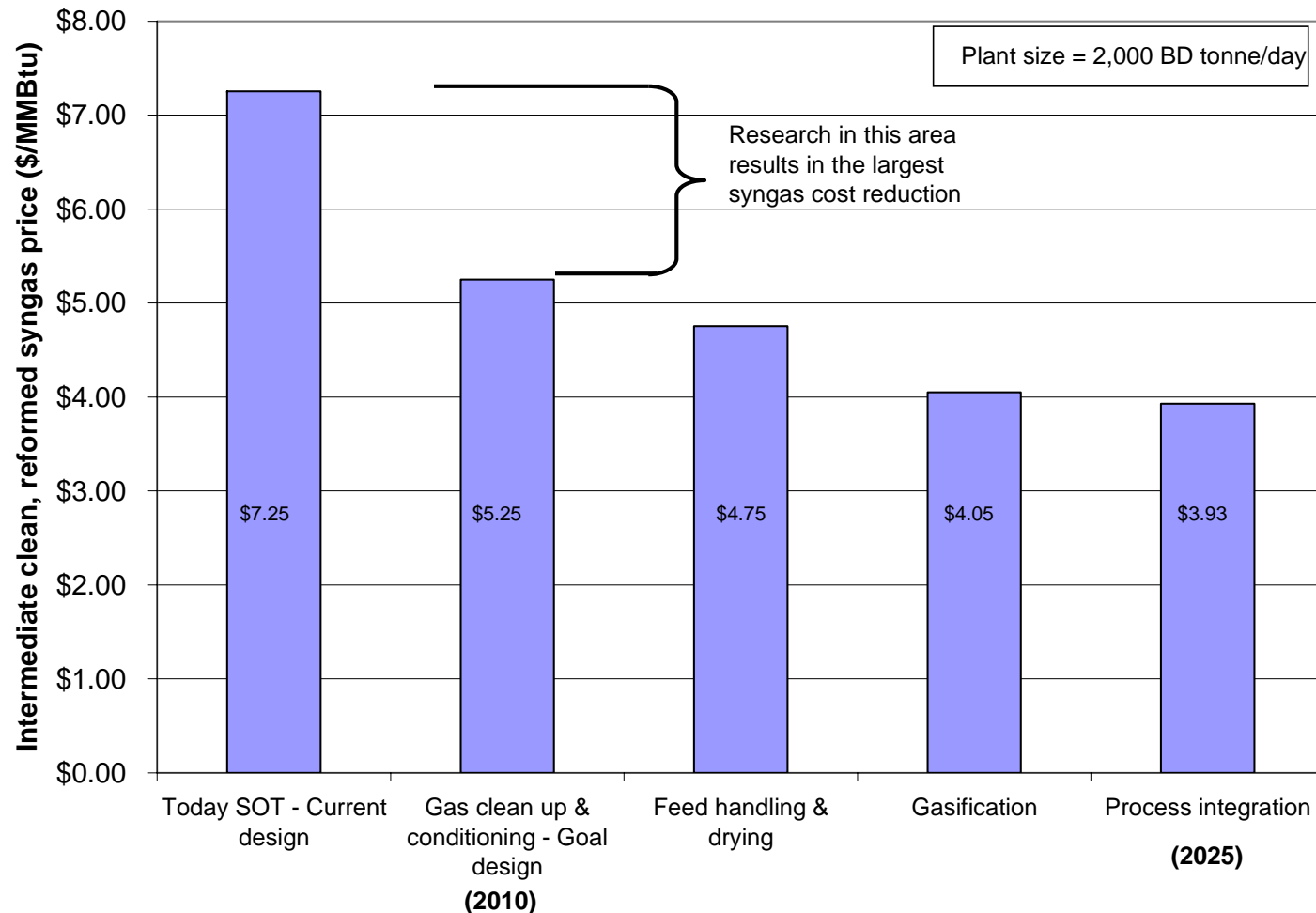




Do we utilize Analysis to Prioritize our Barriers?

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- DOE program targets based on intermediate syngas price to track progress toward reducing technical barriers



Decrease in syngas price due to increased yields, decreased capital costs, & efficiency gains



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Ag Residue Processing

B Milestone

Demonstrate and validate combined heat and power from lignin intermediates/residues

C Milestone

Demonstrate combined heat and power production from lignin

C Milestone

Validate integrated production of heat and power from lignin at pilot scale

C Milestone

Validate integrated production of heat and power from lignin at demonstration scale

C Milestone

Validate feeder systems to reliably feed solid biomass to high pressure (30 bar) systems

C Milestone

Validate gas cleanup performance

B Milestone

Demonstrate and validate biomass gasification to produce syngas for \$4.89/MM Btu by 2020

C Milestone

Validate gasification performance

C Milestone

Validate capital costs - ROI hurdle rate versus cost magnitude hurdle amount

C Milestone

Validate integrated gasification and gas cleanup at pilot scale

C Milestone

Validate integrated gasification and gas cleanup at demonstration scale



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Ag. Residue Sugar Area Milestone Hierarchy

B Milestone

Demonstrate and validate
ag. residue fractionation
to produce \$0.064/lb
mixed, dilute biomass
sugars by 2020

Intermediate Targets

2007: \$0.13/lb at \$53/ton
2012: \$0.10/lb at \$45/ton
2020: \$0.064/lb at \$35/ton

Low-Cost
Enzymes are
Available

Low-Cost
Pretreatments
are Available

Economic
Internal Heat
and Power
Demands
Demonstrated

Capital Cost
Limit Metric

Pilot Scale
Integrated
Pretreatment
and Enzymatic
Hydrolysis

Demo. Scale
Integrated
Pretreatment
and Enzymatic
Hydrolysis

C Milestone

Validate cellulase
enzyme cost at the
equivalent of \$0.xx/lb
sugar (see
intermediate targets)

C Milestone

Validate pretreatment
technology cost at the
equivalent of \$0.xx/lb
sugar (see
intermediate targets)

C Milestone

Demonstrate ability to
economically satisfy
internal heat and
power demands

C Milestone

Capital cost limits
based on least cost
design basis and/or
industry financing
hurdle

C Milestone

Validate integrated
pretreatment and
enzymatic hydrolysis
at pilot scale

C Milestone

Validate integrated
pretreatment and
enzymatic hydrolysis
at demonstration
scale



Pathways and Milestones – C-level and Project Milestones

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Aq Residues

Perennial Grasses

Woody Crops

Pulp and Paper

Forest Products

Validate Cost-effective Gas Cleanup Performance

Validate integrated gasification and gas cleanup at pilot scale

Project Milestones	Type	Performance Expectations	Due Date
X			
Y			
Z			



Project Budgets

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Project	FY 04	FY 05	FY 06 Plan
3.1. Feed Processing/ Handling		400	300
3.2. Gasification	2,725	1,667	1,220
3.3 Cleanup and Conditioning	3,053	4,273	3,470
3.5 TC Analysis	851	750	610
Total Funding	6,629	7,090	5,600



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